

ZOOLOGY.—*Two new lungworms, Protostrongylus gracilis and Varestrongylus sinicus (Nematoda: Protostrongylinae), from sheep and goats in China.*¹
G. DIKMANS, U. S. Bureau of Animal Industry.

The nematodes described below were collected from sheep in China and sent to the United States by Drs. P. L. Li and F. J. Kwong, of the Northwest Epidemic Prevention Bureau, Lanchow, China. They were submitted to the Zoological Laboratory of the National Institute of Health. Dr. E. B. Cram, of that laboratory, subsequently referred them to the Zoological Division of the Bureau of Animal Industry.

Protostrongylus gracilis, n. sp.

Description.—Male (one entire specimen available) 8.5 mm long and 0.065 to 0.07 mm wide in region immediately anterior to bursa. Bursal rays arranged in pattern characteristic of the genus, namely, ventral rays originating from a common stem, separated in their distal portions, ventroventral somewhat shorter than lateroventral. Anterolateral or externolateral ray, shortest of the bursal rays, separated from both ventral and other lateral rays. Mediolateral and posterolateral rays close together, the former reaching the margin of the bursa. Externodorsal separate. Dorsal ray short, rounded, apparently provided with small papillae on the ventral surface as in other members of the genus. It is, however, impossible to determine their size and location in the material available for study. The usual chitinous arc and telamon are present. Spicules 0.325 mm long. Gubernaculum² consists of the usual three parts, capitulum, corpus and crura, or head, body, and legs. Capitulum or head is a light refracting, colorless body, consisting of three parts, two boat-shaped structures with keels directed dorsolaterally and a third part ventral to them with arms extended at right angles. Corpus or body supported distally by two laterally placed, sclerotized rods extending anteriorly from the crura or legs for a distance of 0.050 mm. Remainder of corpus is, like the head or capitulum, colorless. Crura or legs 0.030 to 0.035 mm long, moderately sclerotized, light brown; they are slightly curved ventrally

¹ Received June 1, 1945.

² For the purpose of describing this structure, the terminology of Schulz, Orlov, and Kutass (Zool. Anz. 102(11/12). 1933) has been adopted.

in their distal portions and end in more or less blunt points.

Female.—Length unknown (no entire specimens being available for study), width about 0.040 mm. Vagina about 0.450 mm long. Vulva located on rather prominent protruberance about 0.150 mm from tip of tail. Anus 0.050 mm from tail end. Tail bluntly rounded. Eggs in utero 0.090 mm long by 0.035 to 0.040 mm wide. Pro vagina absent.

Hosts.—Sender (Dr. P. L. Li) reports nematode commonly present in sheep and goats in Lanchow, China. Specific identity of sheep and goats not stated.

Location.—Terminal bronchioles and lung tissue.

Distribution.—Lanchow, China.

Specimens.—U.S.N.M. Helm. Coll. No. 45104.

Remarks.—*Protostrongylus gracilis* resembles *P. skrjabini* as described by Boev (1937), but that author presented no figures with his description. It is, therefore, impossible, at the present time, to compare the two nematodes, especially with reference to those structures upon which species differentiation in the genus is based.

Varestrongylus sinicus, n. sp.

Description.—Male 12 to 15 mm long and 0.150 mm wide in region anterior to bursa. Tail sharply bent and rigidly supported so that it is almost impossible to flatten out the posterior part of the body in the ventrodorsal position. The ventral parts of both lobes of the bursa are folded inward so that the course and disposition of the terminal portions of the ventral rays are difficult to follow. The arrangement of the bursal rays is similar to that of other members of the subfamily Protostrongylinae. The ventral rays arise from a common stem and are separated only in their distal portions. The ventroventral ray is much larger and longer than the ventrolateral. It follows the fold of the bursal lobe and reaches the margin of the bursa. At its termination there is a slight indentation or notch in the bursal margin. The ventrolateral ray is comparatively small. The anterolateral or externolateral ray is, as

in other members of this group of nematodes, rather widely separated from both the ventral rays and from the other lateral rays. The mediolateral and externodorsal rays present no distinctive features, but the posterolateral is very small. The morphology of the dorsal ray, especially its termination, is difficult to determine because of its position in the sharply bent, rigid posterior end of the body. It has a fairly long stalk and appears to terminate in two or perhaps three processes. Spicules 0.350 mm long provided with the usual sclerotized combs or rods beginning about 0.2 mm from

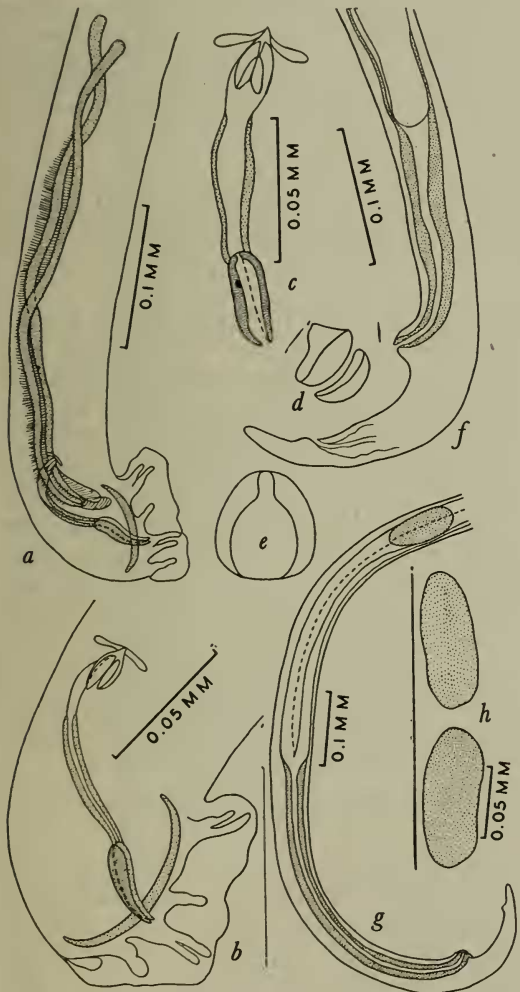


FIG. 1.—*Protostrongylus gracilis*, n. sp.: a, Posterior end of male, showing spicules; b, posterior end of male, showing gubernaculum and bursal rays; c, gubernaculum; d, parts of head of gubernaculum; e, telamon, diagrammatic; f, posterior end of female; g, posterior end of female, showing length of vagina; h, eggs.

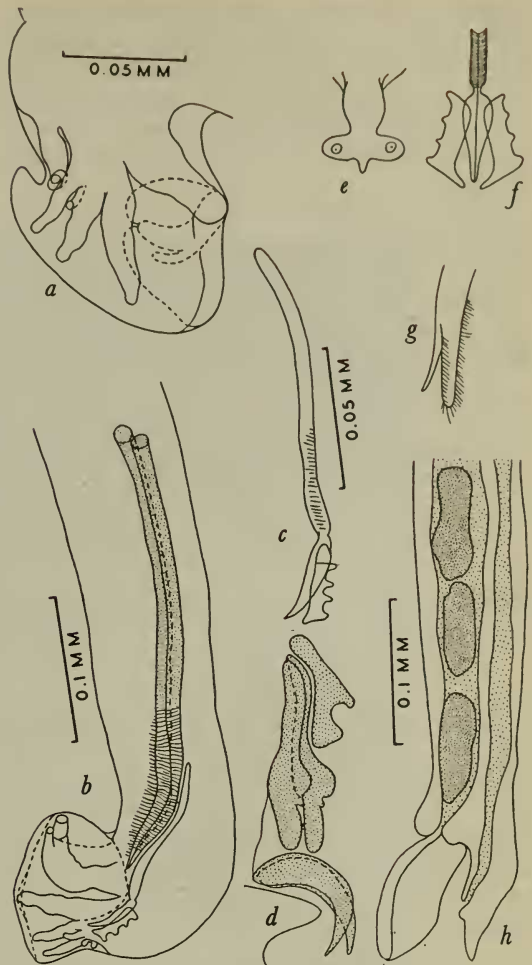


FIG. 2.—*Varestrongylus sinicus*, n. sp.: a, Bursa of male, lateral view; b, posterior end of male, showing length of spicules; c, gubernaculum; d, ventral part of telamon, lateral view; e, dorsal ray; f, terminal part of gubernaculum, diagrammatic; g, distal end of spicule; h, posterior end of female.

the proximal ends. Distal ends split for a distance of 0.05 mm. Gubernaculum, 0.140–0.150 mm long, consists of proximal and terminal portions divided by a constriction located about 0.1–0.110 mm from the proximal end, terminal portion ending in a sharp point. On each side of the terminal portion, originating at about the level or slightly below the constriction, is a more or less rectangular shaped sclerotized structure, its dorsally directed edge serrated. As in many other members of the subfamily there is a rather complicated telamon present. One of the striking features of this telamon is that it has two sharply pointed

prongs projecting into the dorsal parts of the lateral lobes of the bursa. On first view these prongs appear to originate from and to be part of the terminal portions of the dorsal ray, but closer study shows that they have no connection with the dorsal ray but are a part of the telamon.

Female.—22 to 24 mm long and 0.175 mm wide. Vagina 1.150 mm long. Lips of vulva swollen and prominent. Vulva about 0.125 mm from tip of tail. Body narrows abruptly immediately posterior to vulva. Anus 0.045–0.050 mm from tip of tail. Well-developed provagina present.

Hosts.—Sheep and goats. Specific identity of sheep and goats unknown.

Location.—Small bronchioles and lung tissue.

Distribution.—Lanchow, China.

Specimens.—U.S.N.M. Helm. Coll. No. 45105, 45106.

Remarks.—*Varestrongylus sinicus* differs from *Varestrongylus pneumonicus* Bhalerao, 1932, the only other member of the genus, principally in the shape of the gubernaculum and its appendages.

LITERATURE CITED

- BHALERAO, G. *On some nematode parasites of goats and sheep at Muktesar*. Ind. Journ. Vet. Sci. and Anim. Husband. 2 (3): 242–254. 1932.
- BOEV, S. N. *Sintetokauliusy legkikh ovets Alma-Atinskoi oblasti Kazakhstana* [The nematodes of the genus *Synthetocaulus* parasitic in Alma-Ata Territory, Kazakhstan]. Rabot. Gel'mintol. (Skrjabin) [Papers on Helminthology (Skrjabin)], 1937: 55–62.

ZOOLOGY.—*Unusual abnormalities in sea-stars*.¹ W. K. FISHER, Hopkins Marine Station, Pacific Grove, Calif. (Communicated by WALDO L. SCHMITT.)

The following notes concern two species, *Linckia columbiae* Gray and *Pisaster ochraceus segnis* Fisher, which are characteristic of the fauna of southern California. Although I have examined sea-stars in almost galactic numbers, I have never before encountered these deviations from the normal.²

Linckia columbiae Gray³

Figs. 1, 2.

This species, which ranges from southern California to the Galápagos Islands, is characteristically asymmetrical. Most specimens have one or more rays in the process of regeneration, and it is possible for an autotomized ray to grow a new disk and four new rays. Such are known as comet forms. In the specimen under discussion (U.S.N.M. No. E. 6606) a new individual is being budded off from the dorsal surface of the shortest ray, to which it is attached

by a very short peduncle about 4 mm thick. The dorsal plates of the parent are in complete continuity with the plates of the young one, but in the latter all the normal categories of plates are perfectly differentiated. The young has two unequal madreporites, with a third in the process of separation from the larger. The parent has three madreporites. They vary from three to five in the species. The young has one papula to an area on the four rays but none on disk; the parent has a maximum of 10 or 11. There are four ambulacral furrows with their bordering granules. Owing to dessication it is not possible to determine whether mouth and anus are present.

Pisaster ochraceus segnis Fisher⁴

Fig. 3.

In the specimen shown in Fig. 3 (U.S.N.M. No. E 6607) the rays have fused nearly to tip along the *lateral* part of the abactinal surface. The dorsal surface of the fused rays has two series of carinal spines, the space between which is equal to about half width of the two other dorsolateral areas. The superomarginal plates of the fused halves as well as the inferomarginal, are

⁴ *Idem*, pt. 3: 171, pl. 73, figs. 4, 8; pl. 75, fig. 6; pl. 84. 1930.

¹ Received April 22, 1945.

² I am indebted to Mrs. Edward H. Anderson, formerly Miss A. E. Blagg of the Hopkins Marine Station staff, who found these specimens among *miscellanea zoologica* at the Compton, Calif., Junior College. They were probably taken not far from San Pedro, Calif.

³ W. K. Fisher, *Asteroidea of the North Pacific and adjacent waters*. U. S. Nat. Mus. Bull. 76, pt. 1: 242, pl. 48, figs. 1–7. 1911.